THE · EXTENSION PATHOLOGIST

A NEWS LETTER FOR EXTENSION WORKERS INTERESTED IN PLANT DISEASE CONTROL



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## EXTENSION PATHOLOGISTS DISCUSS 4-H CLUB WORK

The subject, The Place of Plant Pathology in 4-H Club Work, was discussed at a get-together of the extension plant pathologists at Columbus, Ohio, Friday night, December 29, 1939, under the chairmanship of C. C. Allison of Ohio. The group was fortunate in having present during a part of the session Mr. A. B. Graham, formerly in charge of subject-matter specialists' work with the Extension Service, who took an active part in the discussion and added some very constructive suggestions.

Mr. S. B. Fenne of Virginia started the meeting with a discussion of 4-H field projects as developed in his State. He said that 4-H plant pathology projects are new in Virginia and that this is the first year they have been carried. In general, club members are rather young to understand plant diseases. They get along better in a study of insects which are large and easily seen. In Virginia club members study insects for the first 2 years and plant diseases for the last 2 years of the 4-H project. (See project statement on page 33.) Any 4-H project must be practical and must show definite results in work accomplished. It must also be financially profitable if possible.

Mr. Fenne said plant pathology projects might be of three kinds as follows:

I. A complete plant pathology project which could be supervised most efficiently in an organized plant-disease club, all members of which are enrolled in the same project. The project leader could give instructions and demonstrations on: (1) Culture of common molds - bread mold, etc.; (2) collection, identification, and preservation of disease specimens - riker mounts, microscope, and literature; (3) exhibits at club, community, and county fairs; (4) identification contests at fairs, etc.; (5) tours to see what other members are doing; and (6) field control - study sprays, resistance, seed treatment, etc.

II. A plant pathology project in keeping a complete record of occurrence, severity, and control of plant diseases on the farm. This project might be similar to the farm-accounts projects carried on in many States. The club member would be required to collect, identify, and preserve specimens of all plant diseases found on the farm, and keep an

accurate record of the dates of occurrence, loss, etc. He would have charge of the plant disease control practices on the farm such as (1) seed treatment, (2) spraying, (3) rotation of crops, and (4) sanitation. He should arrange result demonstrations with checks, and at the end of the year should turn in a complete narrative and financial annual report.

There would not be many club members capable of handling this kind of project. Only older boys or girls with a special interest in plant diseases would make a success of it.

III. A project somewhat similar to the above except for actually carrying out the control practices. In other words, a complete record of the occurrences and severity, and the collection, identification, and preservation of disease specimens, followed by a study concerning each one. This project would be simpler and easier to do, but would be less effective than the first two.

A discussion of activities at 4-H Club camps then developed. Camps are ideal places to interest leading club members in plant-disease projects if the proper amount of time can be allotted, and especially if the location of the camp is such that examples of plant diseases can be found nearby. Mr. H. R. Garriss of North Carolina summarized this part of the discussion.

Dr. O. D. Burke of Pennsylvania followed with pertinent comments on plant disease collections or an herbarium of cultivated crop diseases. He seemed to think that such a project would fit in best with the senior 4-H Clubs, that a study of plant diseases would make a good project for older-youth groups. In this connection a simpler, basic plant-disease manual would be needed, and this subject came in for considerable discussion.

One point that received special emphasis during the meeting was the desirability of tying in the work of plant pathology with that of other specialists and the program of the State club leaders.

As the meeting progressed the suggestions made as to how work could be carried on with young people were put on the blackboard and the following outline resulted:

Ways in Which Extension Plant Pathologists Can Work With Young People

1. Assist with crop projects, such as potato, tobacco, sweetpotato, garden crops, wheat, sorghum, corn, cotton, flax, and flowers, including certified seed or improved seed of various kinds.

a. Aid club leaders in planning and outlining program.

b. Teach subject to county and community leaders.

c. Prepare materials for members. This would include directions, chemicals, etc.

2. Conduct studies at camps.

a. Collect, identify, and preserve specimens.

b. Field trips for study of local disease situations.

c. Contests (may be overemphasized).

d. Demonstrations and lectures.

e. Inoculation demonstrations using bread mold, etc.

f. Use of the microscope.

3. Teach subject to vocational teachers or students who are interested.

4. Coach demonstration teams.

5. Conduct plant disease judging contests.

6. Conduct junior demonstrations.

The meeting adjourned with the suggestion that a similar one be held at Philadelphia in 1940. Extension specialists present were: Kansas, J. O. Miller; Massachusetts, O. C. Boyd; New York, Charles Chupp; North Carolina, Luther Shaw and Howard R. Garriss; North Dakota, F. Gray Butcher; Ohio, A. B. Graham and C. C. Allison; Pennsylvania, O. D. Burke and H. W. Rankin; Virginia, S. B. Fenne; Washington, D. C., R. J. Haskell; and West Virginia, J. G. Leach.

Virginia 4-H Club Project in Entomology and Plant Pathology

The purpose of this project is to familiarize 4-H Club members with insects and diseases, and to show their relationship to man. Some insects and fungi are beneficial and necessary; others are very destructive and compete with man in his struggle for existence.

Boys and girls will be closer to living things while on the farm, where they can observe the damage caused by these organisms, than they will be when they go off to school.

Students may not study biology and, therefore, may never have another chance to study insects and diseases under supervision. Regardless of their chosen vocation, there will come a time when they must have some knowledge of insects and plant diseases.

The immediate advantage is the help that they may be able to give their parents in the control of these pests, since they will have a knowledge of the available sources of information.

The goal is for club members, over a period of years, to obtain a knowledge of insects and diseases of plants and their relationship to human life.

An outline of the project month by month over a 4-year period follows:

| Month | 1st Year | 2nd Year | 3rd Year | 4th Year |
|---|---|---|---|---|
| Dec. | Outline of year's work | Outline of year's work | Outline of year's work | Outline of year's work |
| Jan. | Make collection net | Make riker mounts | Introduction to plant diseases | Introduction to control methods |
| March | Make collection box | Select insects to be reared | Collect and preserve plant disease specimens | Study resistance, exclusion, eradication, protection |
| April | Make spreading board | Make preservative for immature insects | Collect and identify common plant diseases | Collect, identify, and control diseases on the farm |
| May | Pin insects and spread butterflies | Select control project | Collect and identify common plant diseases | Collect, identify, and control diseases on the farm |
| June | Collecting trips | Make and apply insecticides | Mount disease specimens | Collect, identify, and control diseases on the farm |
| July | Identify insects | Tour of life-history and control demonstrations | Study the limiting factors of disease spread | Reports of tours and trips to plant-disease projects |
| Aug. | Exhibits and reports | Fill riker mounts; check control results | Exhibits and reports | Exhibits of diseases and control materials |
| Sept. | Exhibits and reports | Exhibits and reports | Exhibits and reports | Exhibits of diseases and control materials |
| Oct. | Study of literature on insects | Judging or identification contest | Judging or identification contest | Judging or identification contest. Reports |
| Nov. | Study of life cycle | Fall clean-up, fall plowing, and school exhibits; study relationship between insects and diseases | Fall clean-up. Study control methods | Fall clean-up and fall plowing |

## 4-H CLUB WORK IN MASSACHUSETTS

The plant pathology specialist cooperates with E. H. Nodine, assistant State club leader, and with the county club agents in supplying information and material for their garden club projects. A set of lantern slides illustrating various diseases of the flower and vegetable gardens, including a talk for them, was lent to Mr. Nodine and some of the county club agents for their 4-H meetings. Samples of disease-

specimen packets and mounts to demonstrate how they are made and employed for preserving and exhibiting specimens were also supplied. In addition, the specialists prepared permanent mounts of 25 vegetable diseases and lent them to Mr. Nodine to be used by him and county club agents in judging contests at county fairs and State-wide contests. The two leaflets prepared and issued to 4-H leaders and members last year were distributed again this year, that is, directions for collecting, pressing, and mounting disease specimens, and an illustrated and descriptive leaflet on symptoms, seasonal history, and control of garden diseases.

-- O. C. Boyd, extension plant pathologist, Massachusetts. Annual Report, 1938.

## TEXAS CLUB BOYS PROVIDE BLIGHT-RESISTANT MILO SEED FOR COUNTY

Twenty-one Runnels County 4-H Club members signed to grow a total of 66 acres of blight-resistant milo seed with which to further improve the milo grown in the county. Of this especially selected milo seed, 200 pounds were obtained from the Lubbock Experiment Station. These 4-H Club boys will grow the maize, hold a maize show next summer, and save the seed for Runnels County farmers who wish to obtain a superior seed that will resist blight.

A goal of 25 boys and at least 75 acres of maize will, no doubt, be reached. This amount of milo, if an average yield is made, will produce about 100,000 pounds of seed, which will be enough to practically supply all Runnels County farms with seed for the 1939 plantings. Runnels County is the leading milo-growing county in Texas and was probably hit harder by this blight disease than any other county. It is the opinion of the 4-H Club leaders that club members can render a real service through their milo-growing work.

A. J. Standiford, first year 4-H Club boy of Cottle County, planted 2 pounds of disease-resistant yellow milo seed over a 2-acre area. The yield from this crop was 4,600 pounds of grain which he sold for planting seed at 2½ cents per pound, or a gross return of $115.

Another 4-H Club boy, R. B. Wilkerson, also received 2 pounds of the blight-resistant milo seed and harvested one and a half times more milo per acre than did his father who used the common seed. He said that his father plans to plant his entire acreage with the blight-resistant milo next year. The father states, "This boy is showing me the road to better farming methods, and I have always thought in the past that boys could not show us anything!"

--E. A. Miller, extension agronomist, Texas. Annual Report, 1938.

# EXTENSION WORK ON DISEASES OF COTTON AND OTHER SOUTHERN CROPS*

By R. J. Kaskell
Senior Extension Plant Pathologist,
U. S. Department of Agriculture.

Since the year that has just closed marks the 25th anniversary of extension work as we know it today, it might not be amiss to open this subject with a brief historical sketch of some of the earlier work. It might then be appropriate to describe some of the projects that are now being conducted and indicate a few of the needs and opportunities that should be given attention in the future.

## A Few Historical Facts

The dissemination of information on plant diseases has been going on for many years. The early botanists of the land-grant colleges 50 to 60 years ago began to study and give out information on the control of diseases of cotton and other southern crops. Talks on plant diseases and their control were included on programs of farmers institutes. Seman A. Knapp and his coworkers in their campaign to restore cotton production in 1903-04 advised farmers on cotton diseases, as well as on boll-weevil control.

By 1912, W. A. Orton and associates in the Bureau of Plant Industry, cooperating with the South Carolina Experiment Station and the Georgia State Board of Entomology, were introducing the wilt-resistant Dixie Triumph cotton and the Iron cowpea. In cooperation with the Bureau of Plant Industry's Office of Farmers' Cooperative Demonstration Work, they followed through with many successful demonstrations of these resistant varieties.

The passage and approval of the Smith-Lever Act, May 8, 1914, providing substantial Federal funds for instruction and practical demonstrations to rural people, established extension work on a firm basis. It set up the county-agent system as we have it today, thus providing a means of reaching farm people with helpful information, including that of plant-disease control.

Shortly thereafter the emergency of the World War called for increased food production. Large emergency funds were made available for more intensive extension activities. We entered the war in April 1917, with 2,149 county agents, but by November 1918, this number had been increased to 5,218, or more than doubled. Extension specialists in plant pathology were appointed in most of the Southern States to help control crop diseases and thereby to safeguard the Nation's food supply and stimulate agriculture. This provided the first real opportunity for

*Paper read at meeting of Southern Division of the American Phytopathological Society, Birmingham, Ala., February 7, 1940.

extension teaching on plant-disease control in the South. An adequate summary of the results obtained by this emergency work is not possible here, but in the report of the Chief of the Bureau of Plant Industry for the period July 1917 through June 1918, the following statement was made:

> "Demonstrations on cotton wilt resulted in larger acreages of wilt-resistant cotton than ever before. Two large cotton farmers in South Carolina report a saving through planting wilt-resistant cotton of approximately $115,000."

It was further stated that demonstrations on control of sweet-potato diseases, using disease-free roots, in Accomac County, Va., resulted in benefits to the farmers of that county amounting to $100,000.

Although some of the Southern States are still actively carrying on their projects in extension plant pathology, all, with the exception of Virginia, found it necessary to terminate them upon withdrawal of emergency funds. However, since that time, the work has been re-established in North Carolina, South Carolina, and Georgia. In Florida, through changes in duties, the extension specialist in plant pathology has become the extension citriculturist.

## Present Organization

In Virginia, where plant pathology extension work has been carried on continuously since November 1919, the project is now being led by S. B. Fenne with headquarters at Blacksburg. Since there is no extension entomologist in the State, he also carries certain entomology projects. His main lines of work are diseases of tobacco, cottonseed treatment, small-grain diseases, corn diseases, sweetpotato root knot, forage-crop diseases, and peanut dusting.

In North Carolina, Luther Shaw has been heading the project for the last few years, but during recent months, owing to a change of duties, he has devoted only a portion of his time to extension work. However, Howard R. Garriss has been appointed full time to assist Dr. Shaw. The major lines of work in North Carolina are tobacco diseases, cotton diseases (especially seed treatment), strawberry leaf-spot control, cabbage yellows, potato diseases, and peanut leaf spot.

In South Carolina, W. C. Nettles occupies the dual position of extension entomologist and plant pathologist. On the plant pathology side, his work has been mostly on cottonseed treatment, control of cereal diseases through the use of seed treatment and disease-resistant varieties, seed treatment of vegetables and potatoes, and sugarcane diseases. His work on the chemical treatment of fence posts to preserve them against insects and decay is an interesting joint insect and disease project.

In Georgia, extension work in plant pathology was re-established in 1936 with the appointment of H. W. Rankin as leader. He was followed in 1938 by S. B. Fenne and in 1939 by H. I. Borders, who now occupies the position. Mr.

Borders has been very active in control of blue mold of tobacco by spraying and other seedbed treatments. Since, on the average, blue mold seems to hit Georgia harder than other States, this work is of much value. He has also been conducting work on cottonseed treatment and testing; diseases of corn, wheat, and oats; and peanut dusting; and is assisting with the development of a certified seed-potato industry.

## Cotton-Disease Work

Of the various cotton-disease problems, possibly the ones that have received most attention from the extension standpoint are Fusarium wilt, rust or potash hunger, angular leaf spot and damping-off. I have already mentioned the early demonstrations with wilt-resistant cotton varieties. Their superiority on wilt-sick land has been so well demonstrated for so many years that they have gradually become accepted. Breeders have taken over much of the work of producing and improving them to meet different conditions, and the extension problem today appears to be not one of showing farmers the advantages of wilt-resistant varieties but one of helping to decide which variety will be best for a given situation, distinguishing Fusarium wilt from Verticillium wilt, advising on fertilizers, etc.

Much the same may be said with regard to rust, or potash hunger, which showed up especially during World War times when there was a shortage of potash in commercial fertilizers. The causes of this disease are generally known and are usually taken into account in selecting fertilizer formulas. Except in certain difficult areas, the problem can be well taken care of through application of sufficient, balanced amounts of potash and by following soil improvement practices.

Treating cottonseed with chemical dust disinfectants for reducing losses from damping-off, anthraonose, angular leaf spot, and probably other diseases is a comparatively new practice. Because of the activity of extension pathologists in promoting it, and the extremely beneficial results obtained, the practice deserves special mention. In my opinion cottonseed treatment ranks along with hybrid corn as a recent technological development in agriculture. Although some of the earliest experimental work on cottonseed treatment was done in Georgia, North Carolina, Mississippi, South Carolina and some of the other States, it was not until about 1936 that intensive extension teaching of the practice got under way.

In North Carolina, 1939 marked the fourth year of intensive extension work on cottonseed treatment. The results have recently been reported by Garriss and Shaw in Plant Disease Notes, November 1939. In 1935, it was estimated that about 7,000 acres were planted with treated seed. The next year there were about 24,000, the next 200,000, the next 450,000, and last year about 600,000 acres. Garriss and Shaw estimate that during these 4 years the increase in value of the cotton per acre from seed treatment has ranged from $13.05 in 1936 to $2.96 in 1939, with an average gain of $9.82 per acre. This would represent a total benefit to North Carolina growers during the 4-year period of $11,830,000.

The procedures used in securing farmer adoption of this practice have been mainly farmers' meetings, news articles, and demonstrations especially. A total of 191 result demonstrations were completed during the 4 years. Careful stand counts were made before and after chopping, and estimates of yields were obtained. These results were compiled each year and made full use of in the news articles and farmers' meetings. The practice is now well beyond the demonstration stage. Spread of influence, meetings, publicity, and enough field work to keep track of new materials and seasonal developments will probably suffice to handle this project from now on.

In South Carolina much the same story can be told. Starting with about 4,000 acres planted with treated seed in 1935, the acreage rapidly increased each year until in 1939 there were over one-half million acres. It was estimated that South Carolina farmers were more than $2,000,000 better off for having treated cottonseed in 1936 and 1937. Here again cottonseed treatment has become an established practice.

In Georgia it was estimated that about 20,000 acres were planted with treated seed in 1936, 80,000 in 1937 and 160,000 in 1938. Although the practice has not been adopted as rapidly as in the other two States, the benefits per acre would appear to be even greater, with average annual increases in stand of treated over untreated cotton amounting to 36 percent in 1936, 46 percent in 1937, and 41 percent in 1938.

In Virginia intensive work was done last year with demonstrations in all the cotton counties. The results showed that seed treatment increased the yield of cotton 28 percent over no treatment, and that the increased value of cotton per acre averaged $11.95. It is estimated that about 90 percent of all cotton growers in Virginia treated their cottonseed in 1939.

With regard to the situation in the other cotton States where there are no extension plant pathologists, I have no adequate data at this time. I know that there is considerable seed treatment going on. I know that experiment-station pathologists have recommended it and that there has been more or less publicity about it, but at the present time I have no way of determining how much. Many cotton breeders and seedsmen are selling treated seed, and farmers are gradually learning about it, apparently not as rapidly, however, as in the States I have just mentioned where there is someone on the job to teach and promote the practice. Since experimental work in many States appears to justify it, and since anthracnose seems to be one of the principal diseases that is being controlled and the surveys show anthracnose to be a factor as far west as the eastern borders of Texas and Oklahoma, cotton growers of all the States of the eastern Cotton Belt would probably stand a good chance to benefit from cottonseed treatment. It would seem that more extension work could well be done on cottonseed treatment in these States.

## Tobacco Diseases

Blue mold, or downy mildew, of tobacco is a major factor in the production of tobacco plants in the South. Extension work on the control of it and other seedbed diseases seems to be progressing well in all southern tobacco States. In Virginia, North Carolina, and Georgia, tobacco-disease control is the major line of work of the extension pathologists. In South Carolina, Kentucky, and Tennessee the extension tobacco specialists are promoting disease control along with other phases of their work with that crop. In Florida, the Tobacco Experiment Station at Quincy, assisted by other members of the experimental staff in times of emergency, takes care of the more urgent needs. Research on tobacco-disease control has been making rapid progress during recent years, and it is necessary that the State extension services be ready to take hold of new practices and to adopt and demonstrate them to meet the needs of the growers. Some idea of the way this is being done may be gained from the following illustrations:

In 1938, starting about the first of January, a campaign was conducted in Georgia to demonstrate the value of the newly developed copper oxide and cottonseed oil spray for blue-mold control. One of the railroads cooperated with the Georgia Extension Service by fitting out and running a special train called "The Blue Mold Special." Over 3,300 people were reached at the stops made by this train. The specialist held 107 other method demonstration meetings with an attendance of 8,353 more persons. He and the county agents wrote circular letters, prepared news articles, and in many other ways brought the information to the attention of growers. At the close of the season a check-up with manufacturers of spraying equipment and materials indicated that 1,273 bucket-type spray pumps, 650 barrel sprayers and 200 traction spray outfits had been sold. Six thousand pounds of red copper oxide, 3,000 gallons of lethane spreader, and 6,000 gallons of cottonseed oil had been dispensed for spray purposes.

In North Carolina last season the specialists demonstrated all three of the recently developed tobacco seedbed treatments in order that farmers could judge for themselves which might best suit their needs. Records of numbers of plants pulled were obtained from 19 demonstrations with benzol fumigation, 11 with paradichlorbenzene, and 30 with copper oxide spray. All showed substantial gains from 3 treatments.

In Virginia last year the extension plant pathologist demonstrated the new seedbed treatments. A total of 112 method demonstration meetings were held with an attendance of 2,917 growers.

An excellent start has been made with the tobacco-disease work, but it is only a start. Much remains to be done in following through with the seedbed service work, in teaching growers to recognize the various diseases, in assisting with new problems, and in helping them to work out solutions and put them into practice.

## Peanut Diseases

An extension project that has been started in a few States is the dusting of peanuts with sulfur for disease and insect control. Remarkable increases in yield of nuts and hay have been obtained in numerous tests and demonstrations. Although the project might still be said to be in the experimental stage, it is one that has interesting possibilities for bettering the farm feed supply as well as the cash income.

## Potato Diseases

Another line of endeavor which offers an opportunity for some good extension work is that on diseases of sweetpotatoes and Irish potatoes, both very important southern crops. Great improvements due to a wider use of certified seed and slips, to better cultural practices, and to better storage methods, are noted in disease conditions today as compared with several years ago. However, diseases continue to take heavy tolls in field and storage, and greater emphasis should be put on such projects as the production, obtaining, and use of good certified seed and plants; the control of stem rot, black rot, scurf, and pox of sweetpotatoes; and on better storage methods. If the sweetpotato starch industry is to develop in the South, and the roots are to remain in the ground several weeks later than usual, black rot and other root decays will need to be given attention.

## Vegetable Diseases and the Home Food Supply

The South's vegetable industry is one that needs to be protected. With the arrival of the frozen-pack method more vegetables are going to be grown in the North and West. To meet this competition, greater attention will have to be given to decreasing costs of production and improving quality through disease and insect control.

More food and feed produced on the farm for home use is an urgent need. The protection of the home garden and cereal and forage crops from heavy disease losses is essential in order to make the "better living from the farm" program a success. Resistant varieties, disease-free seed, disinfected and protected seed, and in some cases spraying or dusting muat be given proper consideration.

Recent advances have been made in the control of pecan diseases. These should be taken to the home grower as well as the commercial producer. The winter-legume program needs careful supervision from the disease standpoint. New crops must be watched. These and many other plant disease problems offer great opportunities for research and extension work.

## Plant Disease Control in Relation to Present Day Agricultural Problems

The last few years have brought tremendous changes in the Nation's agriculture, and more are on the way. Large, national programs have been set up to help meet critical farm problems. New methods of management, new enterprises, new crops, and new ways of doing things are coming about. In all these changes affecting crops, the plant pathologist, either research or extension, who can help farmers produce better products at lower costs, has an important part. If crops are to be insured he can make their production less hazardous through disease control; if low-income farmers are to be rehabilitated he can help them toward success through the avoidance of heavy crop losses; if more soil-building crops, more and better home gardens, more feed and forage crops, and more forest trees are being encouraged he can help safeguard them through the practice of disease prevention. We have an important part to perform in these programs, one that I hope will be offered and recognized to an even greater extent in the future.

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